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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/079,759	05/15/98	GARDNER M	2000.002600

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EXAMINER

MAI, A

ART UNIT PAPER NUMBER

2814

DATE MAILED: 04/06/99

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/079,759

Applicant(s)
Gardner et al.

Examiner
Anh D. Mai

Group Art Unit
2814



☒ Responsive to communication(s) filed on Sep 30, 1998

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1-28 is/are pending in the application.

Of the above, claim(s) 1-19 is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 20-28 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

Election/Restriction

1. Claims 1-19 withdrawn from further consideration by the examiner, 37 CFR 1.142(b) as being drawn to a non-elected Group I. Election was made **without** traverse in Paper No. 3.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

2. Claims 20-23 and 25-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Mehta et al. (U.S. Patent 5,646,063).

Note that the present claims are so broad as to encompass forming 2 sets of trenches, separated from one another, one being wide and the other narrower.

Mehta teaches a method for forming an isolation trench in a semiconductor substrate similar as claimed including:

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forming a first recess 46 in a substrate 14, the first recess has a first width (6000 Angstroms) and extends a first depth (500 Angstroms) beneath the surface of the substrate; forming a second recess 45 in the substrate 14, the second recess has a second width (4000 Angstroms) that is less than the first width of the first recess, the second recess extends a second depth (4000 Angstroms) beneath the surface of the substrate, the second depth is greater than the first depth of the first recess; and forming an isolation structure in the first and second recesses. (See Fig. 2-6, col. 4, l. 43-col. 5, l. 54).

With respect to claims 21, 22 and 27, the first and second recesses are filled with a same isolation material 60.

With respect to claim 23, the liner 56 is thermally grown and insulation layer is TEOS hence two different materials.

With respect to claims 25 and 26, both recesses are formed by etching.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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3. Claims 24 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mehta et al. as applied to claims 20-23 and 25-27 above, and further in view of Liou et al. (U.S. Patent 5,130,268).

Mehta teaches a method for forming trench in a semiconductor substrate described above and further includes:

forming an isolation liner 56 in at least portion of the second recess 45; and

forming an isolation material 60 in the second recess and on the substrate.

but fails to form a plurality of spacers in the first recess.

However, Liou et al., in a similar method for forming trench isolation, teaches:

forming an insulating material 24 in the first trench 22';

forming spacers 24' by etchback the insulating layer 24 in the first recess. (See Fig 2b, 2c, col. 8, ll. 7-44).

It would have been obvious to one having ordinary skill in the art at the time of the invention to form the spacers 24' in the first trench 46 of Mehta as taught by Liou because the spacers reduce the opening of the first trench therefore "dishing" of the trench isolation is avoided.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

4. Claims 20-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Kwon (U.S. Patent 5,731,221).

Kwon teaches a method for forming an isolation trench in a semiconductor substrate similar as claimed including:

forming a first recess in a substrate 21, the first recess has a first width W1 and extends a first depth beneath the surface of the substrate;

forming a plurality of spacers 26' in the first recess;

forming a second recess 27 in the substrate 21, the second recess has a second width W that is less than the first width of the first recess, the second recess extends a second depth 27 beneath the surface of the substrate, the second depth is greater than the first depth of the first recess;

forming an isolation liner 29 in at least portion of the second recess 27;

forming an isolation material 28 in the second recess adjacent the isolation liner 29, at least a portion of the isolation liner extending between the spacers and the isolation material; and

forming an isolation structure 28 in the first and second recesses. (See Fig. 2A-2G, col. 3, l. 28-col. 4, l. 40).

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The limitation of claims 20, 24 and 28 are addressed.

With respect to claims 21 and 27, at least one material (HTO) 28 is formed in the second recess.

With respect to claim 23, the isolation structure 28 comprises at least two different materials (TEOS and HTO).

With respect to claim 22, as the device being process further, the material in the first recess 26 and second recess 27 eventually becomes single dielectric material.

With respect to claim 25 and 26, first and second trench are formed by etching.

Conclusion

Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Technology Center 2800 fax center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh Mai whose telephone number is (703) 305-0575. The examiner can normally be reached on Monday-Friday from 8:30am to 6:00pm.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chaudhuri, Olik, can be reached on (703) 305-2794. The fax number for the organization where this application or proceeding is assigned is (703) 308-7722 or -7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center receptionist at (703) 308-0956.

A.M.
A.MAI.

March 29, 1999


Olik Chaudhuri
Supervisory Patent Examiner
Technology Center 2800